Before **the**
Federal Communications Commission
Washington, D.C. **20554**

In the Matter of	)	
	)	
Revisions to Broadcast Auxiliary Service Rules in Part 74 and Conforming Technical Rules for Broadcast Auxiliary Service, Cable Television Relay Service and Fixed Services in Parts 74, 78 and 101 of the Commission's Rules	)	ET Docket No. 01-75
	)	
Telecommunications Industry Association. Petition for Rule Making Regarding Digital Modulation for the Television Broadcast Auxiliary Service	)	RM-9418
	)	
Alliance of Motion Picture and Television Producers, Petition for Rule Making Regarding Low-Power Video Assist Devices in Portions of the UHF and VHF Television Bands	)	RM-9856

REPORT AND ORDER

Adopted: October **30,2002** Released: November **13,2002**

By the Commission:

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I. INTRODUCTION AND EXECUTIVE SUMMARY

1. In this ***Report ond Order,*** we amend Part 74 of our rules pertaining to the Broadcast Auxiliary Services (BAS) to permit BAS stations to introduce new technologies and create a more efficient BAS that can more readily adapt as the broadcast industry converts to the use of digital technology, such as digital television (DTV). We also make conforming amendments to Part 73 of our rules pertaining to the Radio Broadcast Services, to Part 78 of our rules pertaining to the Cable Television Relay Service (CARS),[1] and *to* Part 101 of our rules pertaining to Fixed Microwave Services (FS). In many cases, the BAS, CARS. and **FS** share frequency hands and have technically and operationally similar stations, and our rule changes will permit these three services to operate under consistent regulatory guidelines.[1]

[1] CARS stations are point-to-point or point-to-multipoint microwave systems used by cable and Multichannel Multipoint Distribution Service (wireless cable) operators to receive signals **from** remote locations. Alternatively, CARS can also be used for distribution of programming to microwave hubs where it may be physically impossible or ***too*** expensive to run cable **to** these hubs. CARS stations cannot be used to directly distribute programming to subscribers and can operate on the following shared frequency bands: 1990-2110 MHz (mobile only), 6425-6525 MHz (mobile only), 6875-7125 MHz (mobile only), 12.70-13.20 GHz, and 17.70-19.70 GHz.

For example, the 13,200-13,250 MHz band is shared by common carrier and private point-to-point operations – as well **as** the local television transmission service - in Part 101, TV **BAS** operations in Part 74, and CARS operations in **Part** 78. *See* ***47*** C.F.R. §§ 74.602, 78.18, and 101.147. In all cases, **the** maximum authorized bandwidth is (continued.,..)

I. INTRODUCTION AND EXECUTIVE SUMMARY

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2. Specifically. to conform the **BAS. CARS,** and **FS** rules, we:

- Permit TV and aural **BAS** stations to **use** any available digital modulation technique in all **BAS** frequency bands so that **BAS** stations can take advantage of the latest developments in technology and make smooth the transition to digital TV and digital radio.

- Update BAS emission masks to facilitate the introduction of digital equipment and to provide consistency with emission masks used in Part 101 of the rules.

- Modify the equation used by **BAS** and CARS services for determining the maximum effective isotropic radiated power (EIRP) for short path lengths. This change eliminates the steep reduction in ElRP for **BAS** and CARS path lengths shorter than the minimum.

- **Allow BAS** and **CARS** stations to use automatic transmit power control (ATPC) in order to facilitate more efficient spectrum use.

- Update transmitter power rules for **BAS** and CARS services to provide ElRP limits for all frequency bands.

- Require TV **BAS** and CARS services to prior coordinate their frequency use when using shared frequency bands to minimize the potential for harmful interference occurring when a new station begins transmitting.

3. In addition, we update many other **BAS** rules and make minor rule changes to clarify or **fix** typographical errors in the existing rules. These updates include instituting temporary conditional authority for all **BAS** stations to operate upon filing of a license application, provided certain conditions are met; modifying the Remote Pickup **BAS** channel plan to provide compatibility with the channel plan adopted for private land mobile radio (PLMR) in the Commission's Refarming proceeding (PR Docket No. 92-235); modifying the **BAS** short-term operation rules; and modifying the **BAS** application rules to make them consistent with the Universal Licensing System (ULS).

4. This ***Reporr and Order*** also authorizes wireless assist video devices **(WAVDs)** to operate on certain VHF-TV and UHF-TV channels on a non-interference basis to services allocated on that spectrum. These devices, which are already used by broadcasters, are needed to aid film and television producers in filming at various locations in a safe and cost effective manner.

5. These changes will increase the efficiency of the **BAS** and permit **BAS,** CARS, and FS licensees to operate in an environment in which the potential for interference is significantly reduced, while affording significant flexibility to these licensees.

11. BACKGROUND

6. In the *Notice of Proposed Rule Making (Notice)*, released March 19, 2001. the Commission initiated an extensive review of the **BAS** rules and proposed changes to create a more

(Continued **from** previous page)
25 MHz. ***See*** 47 C.F.R. §§ 74.637, 78.103, and 101.109. Other technical rules. such as ElRP on short paths, differ among the services. This action will align certain technical requirements for these services. ***See,*** *e.g.*, 47 C.F.R. §§ 74.644, 78.108, and 101.143.

efficient BAS that can readily adapt to technological changes in the industry.' The *Notice* followed petitions filed by the Telecommunications Industry Association (TIA) in March 1998 (RM-9418) and the Alliance of Motion Picture and Television Producers (AMPTP) in November 1999 (RM-9856). The TIA Petition requested rule changes for the 23 GHz band, as well as rule changes to permit digital modulation schemes in all of the bands used by the TV BAS.[4] The AMPTP Petition requested authority to use low power WAVDs on unused TV channels in the upper portion of the VHF-TV band and in the UHF-TV band.[5] In addition to these requests. the Commission sought comment on many other changes to the rilles. The proposals were crafted to update the rules and to complement many of the requests made by the petitioners.

111. DISCUSSION

7. Commenting parties generally support the proposals set forth in the *Notice*.[6] For example, the Society of Broadcast Engineers, Inc. (SBE) states that it applauds virtually all of the proposals made in the ***Norice;*** the Association of America's Public Television Stations (APTS) and the Public Broadcasting Service (PBS) state that they generally support the proposals; and the Association for Maximum Service Television, Inc. **(MSTV)** and the National Association of Broadcasters (NAB) state that they applaud allowing digital modulation for all BAS bands and support the revision and conformance of BAS with CARS and FS rules.'[7]

A. BAS Technical Rules (Part 74) and Conforming Technical Rules for Parts 74, 78 and 101

1. Digital Modulation in All Television and Aural BAS Bands

8. Section 74.637 of the Commission's rules sets forth emission requirements for TV BAS operations. Digital modulation is specifically addressed only in paragraph (c), which provides for analog or digital modulation in the 6425-6525 MHz, 17.7–19.7 GHz, and 31.0–31.3 GHz bands. Although the rules do not specifically prohibit digital modulation in other TV **BAS** bands (*i.e.*, 2025-2110 MHz and 2450-2483.5 MHz (2 GHz), 6875-7125 MHz (7 GHz), and 12.7–13.25 GHz (13 GHz)), the Commission's policy relative to BAS has been to allow digital modulation only in bands where it is

[3] Revisions to Broadcast Auxiliary Service Rules in Part 74 and Conforming Technical Rules for Broadcast Auxiliary Service, Cable Television Relay Service and Fixed Services in Parts 74, 78 and 101 of the Commission's Rules, *Notice of Proposed* ***Rule*** *Making*, ET Docket No. 01-75, I6 FCC Rcd I0556 **(2001).**

[4] ***See*** TIA Petition, RM-9418, filed March 5, 1998. We note that the changes sought by TIA for the 23 GHz band have been considered in a separate proceeding. ***See*** Amendment of Part 101 of the Commission's Rules to Streamline Processing of Microwave Applications in the Wireless Telecommunications Services, Telecommunications Industry Association Petition for Rulemaking, ***Reporr*** *and Order*, WT Docket No. 00-19 and RM-9418, (FCC 02-218) (rel. July 31, 2002) at ¶¶ 52-77.

[5] ***See*** AMPTP Petition, RM-9856, filed November 15, 1999.

[6] Commenting parties are listed in Appendix B. Comments to the *Notice* were originally due by June 25, 2001 and reply comments were originally due by July 23, 2001. However, those deadlines were extended until July 9, 2001 and August 7. 2001, respectively. *See* ***Order*** *Granting Extension of* ***Time,*** ET Docket No. 01-75, 16 FCC Rcd I2656 (2001).

[7] SBE Comments at 1; APTS/PBS Comments at 2, 9; MSTVMAB Comments at 2-3

specifically authorized. Therefore. under current policy, licensees must obtain a waiver of the rules to transmit using digital modulation in the 2 Gtlz, 7 GHz, and 13 GHz bands.*

9. In the Nolice, the Commission observed that most TV BAS stations currently transmit frcqucncy modulated analog NTSC video signals. but that with the current transition of television from analog to digital, broadcasters will need to transmit DTV digital signals in addition to their existing NTSC analog signal. The Commission also observed that the digital conversion of TV stations is not the only reason for allowing digital modulation in all TV BAS frequency hands. The rules adopted in the ***.Second Report and Order and Second Memorandum Opinion and Order*** in ET Docket No. 95-18 specify channelization plans for TV BAS licensees to narrow their channel bandwidth in the 2025-2110 MHz band to accommodate the new Mobile Satellite Service **(MSS)** allocation in the 1990-2025 MHz hand. The Commission noted that, as these channels are narrowed, broadcasters will likely switch from analog to digital transmission in order to attain the necessary signal fidelity in the narrower channel. Therefore, primarily to facilitate the transition to digital TV and to accommodate narrower channels in the 2 GHz hand. the Commission proposed to modify the rules in Section 74.637 to permit digital modulation in all TV BAS bands.'

10. In the **Norice,** the Commission also stated that the rules for aural BAS in Section 74.535 create a situation similar to that for TV BAS with respect to digital modulation because it allows the use of digital modulation by aural BAS licensees in the 18 GHz band, but does not address such use in the 944-952 MHz band. The Commission stated its belief that aural BAS licensees could benefit from the ability to use digital modulation in all bands. and that such flexibility would allow aural BAS licensees to take advantage of the spectral efficiency that digital modulation offers. Therefore, the Commission proposed to modify Section 74.535 to permit the use of digital modulation in all aural BAS bands.'"

11. Several parties support the Commission's proposals to permit digital modulation in the 2 GHz, 7 GHz, and 13 GHz TV BAS bands, and all aural BAS bands.'' SBE, while supporting the introduction of digital modulation in all TV and aural **BAS** bands, cautions that digitally modulated signals tend to more fully occupy the channel bandwidth than analog signals, thereby creating a greater chance for interference to occur into adjacent channel FM receivers.'' Accordingly, SBE recommends that conversion from analog to digital modulation be accompanied by frequency coordination, except where an existing digital system has been operating under STA and there is **no** evidence of interference. SBE states that it may be appropriate to conduct a further rulemaking to establish loading standards for digitally modulated point-to-point BAS links. It opposes, however, similar standards for digitally modulated TV Pickup or ENG operations because TV Pickup operations require more robust digital modulation types and higher levels of forward error correction than fixed links.'' Finally. SBE requests

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[8] Currently, there are approximately 500 pending waiver requests for use of digital modulation in the 2 GHz, 7 GHz, and 13 GHz bands on tile at the Commission. In general, the Commission's Wireless Telecommunications Bureau (WTB) has been issuing Special Temporary Authority (STA) to stations to permit them to transmit with digital modulation in these bands.

[9] Notice at ¶ 11

[10] *Id.* at ¶ 12.

[11] ***See*** SBE Comments at 1-2; Comsearch Comments at 2; APTS/PBS Comments at 2; MSTV/NAB Comments at 3; Red River Reply Comments at **1;TIA** Reply Comments at 2: Viacom Reply Comments at 5.

[12] SBE Comments at **1.**

that the Commission grant a blanket waiver for the approximately 500 pending digital **BAS** applications, to allow their immediate grant and obviate the need for further **STA** filing and processing.[14]

12. MSTV/NAB support allowing digital modulation on all **BAS** frequencies and urge that the Commission grant a blanket waiver to allow digital modulation on an interim basis pending the outcome of this proceeding. They contend that permitting broadcasters to use digital modulation in all **BAS** bands will facilitate the transition to DTV.[15] However. they also believe that, in the 2 GHz band, there is uncertainty about the likelihood of implementing MSS. MSTV/NAB therefore urge the Commission to proceed slowly with the development of digital technical rules for the 2 GHz band and to defer adoption of any rules until the issue of potentially reallocating the **MSS** spectrum is resolved.[16]

13. Comsearch states that it supports allowing digital modulation in the 944-952 MHz and 2, 7, and 13 GHz bands without the need for a rule waiver. Comsearch states that, once digital modulation is permitted in these bands, the Commission should consider modifying the BAS frequency plans in these bands, such as by overlaying narrowband channels on the existing 25 MHz channels in the 7 GHz band. Comsearch also recommends that, to promote efficient use of the spectrum, the Commission consider capacity and loading requirements for digital **BAS** systems, similar to those in Section 101.141(a)(3), but adjusted for technical differences in the services.[17]

14. Microwave Radio Communications, LLC (MRC) recommends that digitally modulated **BAS** transmissions be required to contain a signal identifier, either in the program source or the digital modulation process, and recommends a phase-in period during which a universally recognized standard can be adopted.[18] SBE asserts that there is a need for automatic identification for digitally modulated **BAS** and CARS TV Pickup and Local Television Transmission Service stations, to permit quick and easy identification in case of inadvertent interference. SBE recommends that such identification should be comprised of an FCC call sign, a unit number or other identifier, a contact telephone number, and a manufacturer identification and serial number. SBE asserts that such an identification system would be inexpensive and therefore recommends that a Further Notice of Proposed Rule Making he issued to

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[13] *Id.* at 2-3.

[14] *Id.* at 3

[15] MSTV/NAB Comments at 4.

[16] *Id.* at 5. The Commission is considering various options for alternative uses and new allocations in portions of the 1990-2025 MHz band used by the Mobile Satellite Service (MSS). previously allocated to **TV** BAS. For example, in IB Docket No. 01-185, we are seeking comment on proposals that would allow MSS licensees to provide ancillary terrestrial component (ATC) operations in the 1990-2025 MHz MSS band. In ET Docket No. 00-258, we are seeking comment on proposals to support the introduction of new' advanced wireless services, including Third Generation (3-G) wireless systems in spectrum below 3 GHz, including some of the MSS spectrum in the 1990-2025 Mtlz band. In WT Docket No. 02-58, we are exploring various options to improve public safety communications in the 800 MHz band that could include relocating incumbent 800 MHz services to the current **MSS** allocation in the 1990-2025 MHz band. In this connection, we recently suspended for one year. until September 6, 2003, the expiration date for the initial two-year mandatory negotiation period for Phase 1 of the 2 GHz band relocation plan between MSS and BAS. See Amendment of Section 2.106 of the Commission's Rules *to* Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, *Order*. ET Docker No. 98-18, 67 FR 53754 (rel. Aug. 19, 2002).

[17] Comscarch Comments at 2.

[18] MRC Commcnts at 8

explore this issue."

15. *Discussion.* As proposed in the ***Norice,*** we are modifying Section 74.637 to permit use of any available digital modulation technique in all TV BAS bands and are modifying Section 74.535 to permit digital modulation in all aural BAS bands. We find that permitting digital modulation in the 2 GHz, 7 GHz, 13 GHz TV BAS bands, and all aural BAS bands will provide licensees with increased flexibility in the provision of BAS operations, promote more efficient use of this spectrum, and facilitate the transition to reduced channel bandwidths in the 2 GHz band, and to DTV.

16. We see no need to delay the adoption *of* technical rules for digital modulation in the 2 GHz band, as suggested by MSTVMAB. We note that there are approximately twenty pending applications for use of digital modulation in the 2 GHz band and see no reason to delay such operations. Licensees may apply for licenses using digital emissions beginning on the effective date of the rules of this *Report and Order.*

17. We find no need to impose digital loading requirements at this time. We note that no specific proposals were offered and there is no indication that these bands are being used inefficiently. On the contrary, we expect that these bands will be used more intensively with the transition to **DTV** and the development of new broadcast services.

18. With respect to embedded automatic identification for digital modulation, we note that such identification is currently technically feasible and legally permissible under current rules.[20] Rather than codifying mandatory automatic identification procedures and standards, we believe that the industry would be better served with flexibility to develop and maintain such a standard. Under this approach a standard could be quickly updated when new modulation techniques are used. Therefore, we decline to adopt a mandatory standard for automatic identification for digital modulation.

19. In order to facilitate the expeditious processing of the approximately 500 pending applications for digital BAS operations, the following BAS rules as amended in Appendix **A** will become effective **as** of the adoption date of this *Reporr and* ***Order:*** Sections 74.535 and 74.637.[21] Pursuant to 5 U.S.C. §§ 553(d)(1) and 553(d)(3), we find good cause to make these rules effective immediately rather than to follow the normal practice of making them effective 30 days after publication in the Federal Register, due to the pendency of the BAS applications. Accordingly, we will begin processing these BAS applications on rhe adoption dare of this *Report and Order.* Defective BAS applications filed on or before the release date *of* this *Reporr and Order* will be returned with the opportunity to amend. Defective BAS applications filed after the release date of this *Report and Order* may be subject to dismissal. In addition, we will allow relief from any new frequency coordination requirement imposed by the rules we are adopting. such as new prior coordination procedures for fixed systems proposed in

[19] SBE Comments at 3, 4 and 27. SBE would exempt from automatic identification low power, size/weight critical applications until those applications would not be burdened by compliance. ***Id.*** at 3-4. **See** *also* Viacom Reply Comments at 5.

[20] We note that station identification is required for remote pickup BAS stations, aural BAS stations, TV BAS stations with output power ***of*** one wan or more, and low power auxiliary stations with output power exceeding 50 milliwatts. *See* Sections 74.482, 74.582, 74.682, and 74.882. 47 C.F.R. §§ 74.482, 74.582, 74.682, and 74.882.

[21] 47 C.F.R. §§ 74.535 and 74.637

applications accepted for filing before the effective date of the rules." Specifically, we will deem digital applications filed before the effective date of the rules in this *Report and Order* to have been properly coordinated under the existing coordination requirements, absent any evidence to the contrary, and we will not require re-coordination of these applications under prior coordination procedures effective under the new rules that also permit digital modulation." We conclude that adherence to the existing frequency coordination requirements has been sufficient to ensure that these digital and analog/digital systems do not cause harmful interference to existing stations, and that re-coordination, or the imposition of frequency coordination where it was not previously required, would be unnecessarily burdensome to the applicants. Moreover, most digital BAS systems that have been applied for are operating under an STA and we have not received any evidence of interference from rhese systems. We therefore will not require re-coordination for digital applications filed before the effective date of the rules. Finally, we will exercise flexibility with respect to compliance with the technical rules adopted herein when processing these applications.

20. Given the expedited handling and reliefs set forth above, we believe that a blanket waiver as requested by SBE and MSTV/NAB would not further hasten the processing of pending digital applications. and its benefit would be minimal. We therefore find the issuance of a blanket waiver unnecessary, and decline to do so.

2. Maximum Effective Isotropic Radiated Power for Short Paths

21. There are several TV BAS rules that work in tandem to regulate the amount of power that can be used at a specific station. Specifically, Section 74.636 limits, for some frequency bands, the maximum EIRP[24] for which a TV BAS station can be licensed? and Section 74.644 specifies the

[22] Generally, these are the applications previously filed with the WTB seeking a waiver of the rules to allow the use ofdigital modulation in the 2 GHz. 7 GHz, and 13 GHz bands.

[23] Current BAS rules encourage local coordination procedures, except in the 6425-6525 MHz and 17.7-19.7 GHz bands shared with FS operations, where the procedures set fonh in Section 101.103(d), commonly referred to as "prior coordination procedures," are required for both services prior to the filing of an application, and in the 12.7-13.25 GHz band, where an engineering study must be conducted prior to the filing of an application. *See* 47 C.F.R. §§ 74.502(c), 74.503(a), 74.604(a), 74.638, and 101.103(d). Local coordination procedures are not defined in the rules, but rather, Sections 74.503(a) and 74.604(a) place the responsibility for frequency selection to avoid interference on applicants, encouraging the use of local BAS coordinators or coordination committees where they exist, and no evidence of the accomplishment of frequency coordination is required to be submitted with the license application. This process is collectively referred to as "local frequency coordination" or as "local coordination procedures" Prior coordination procedures in Section 101.103(d) require formal notification to and response from all potentially affected licensees/applicants prior to filing an application and the submission of a certification of completion of notification and response. and a list of licensees/applicants notified, with the application. As detailed in Section III.A.7 below, this *Report and Order* adopts prior coordination procedures for all fixed BAS operations except in the 1990-2110 MHz band, where local coordination procedures will remain in effect. We address the need for frequency coordination for applications for digital or analog/digital operation filed under new frequency coordination and major/minor classification rules in Sections III.A.4 and III.C.2 below.

[24] EIRP is the product of the power supplied to the antenna and the antenna gain. The power supplied to the antenna is the transminer output power minus some line loss due to the transmission of the signal from the transmitter to the antenna.

[25] 47 C.F.R. § 74.636

minimum path length for which the maximum EIRP will be authorized for fixed links.[26] Applicants proposing path lengths shorter than the minimum path lengths specified in Section 74.644, are required to reduce power in accordance with the equation provided in that section."

22. Currently, the equation specified in Section 74.644 requires a steep reduction in ETRP for paths slightly shorter than the specified minimum." For example, the maximum EIRP for fixed links operating in the 6875-7125 MHz band is 55 dBW and the minimum path length is 17 km. Based on the current equation, an applicant proposing a path length of 16 km would have to reduce its EIRP to 29.5 dBW, a reduction of more than 25 dB. **As** stated in the *Norice,* this equation was previously used for determining maximum EIRP for short paths for FS operations in Part 101 as well. The *Norice* observed that, in the ***Reporr and Order*** in WT Docket No. 94-148, the Commission adopted a new equation for Part 101 that eliminated the steep drop in EIRP at path lengths slightly shorter than the minimum.[29] Using the equation now codified at Section 101.143,'" the reduction in EIRP for the example above would be approximately 1 dB – a sharp contrast to the 25 dB computed using the current equation in Section 74.644.

23. The Commission further noted that the same equation as currently used for the BAS is also used for CARS. The Commission stated that it believed that the CARS would also benefit from modifying the equation for determining maximum power for short path lengths. Accordingly, the Commission proposed to modify Sections 74.644 and 78.108 to implement the same equation codified at Section 101.143 for determining the maximum EIRP for path lengths shorter than the specified minimum.[31] The Commission noted that BAS rules do not currently specify a minimum path length in the 2450-2483.5 MHz band, but **FS** rules do so for FS operations. The Commission therefore also proposed to adopt a minimum path length, at which the maximum EIRP would be allowed, of 17 km for the **BAS** in the 2450–2483.5 MHz band, consistent with the minimum path length imposed on similar **FS** operations in that spectrum. It took this action to promote spectrum efficiency by preventing the use of overpowered systems by BAS over short paths in that band. Finally, the Commission proposed to grandfather at their current power any existing fixed links in the 2450-2483.5 MHz band that are less than 17 km.[32]

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[26] 47 C.F.R. § 74.644. We will refer to the minimum path length for which maximum EIRP will be authorized simply as minimum path length. We note. however, that this discussion concerns the accommodation of path lengths that are shorter than the minimum path length.

[27] 47 C.F.R. § 74.644(b). The equation specified in the rules is EIRP = 30 – 20 log(A/B) dBW; where A is the minimum path length specified in paragraph (a) of this section and B is the actual path length in kilometers.

[28] *See* ***TIA Petition*** at A.28.

[29] ***See*** In The Matter Of Reorganization And Revision Of Parts 1, 2, 21, And 94 Of The Rules To Establish A New Pan 101 Governing Terrestrial Microwave Fixed Radio Services. WT Docket No. 94-148, ***Reporr and Order.*** 11 FCC Rcd 13449 (1996) ***(Part 101 Order).*** The equation adopted in that action is EIRP = MAXEIRP – 40 log(A/B); where MAXEIRP is the maximum allowable EIRP, A is the minimum path length specified in the rules, and B is the actual path length in kilometers.

[30] 47 C.F.R. § 101.143.

[31] *Notice* at ¶ 16.

[32] *Id.* at ¶ 17

24. The parties generally support the Commission's proposals changing the equation for maximum EIRP for short paths, establishing a minimum path length of 17 km for the 2450-2483.5 MHz band; and grandfathering at their current power level any existing fixed links in the 2450-2483.5 MHz band that are less than 17 km.[33] In addition, SBE and MRC recommend that existing BAS links that were authorized before April 1, 1987 and grandfathered by the current provisions of Section 74.644 with respect to path length and EIRP, and that are modifying their authorizations to convert from analog to multiplexed analog plus digital or to digital operation, should not lose their grandfathered status.[34] SBE explains that such paths may require continued operation at elevated power levels to avert interference from other systems. MRC asserts that grandfathered status should continue for such paths, provided the converted paths do not cause harmful interference to existing co-channel or adjacent channel systems. MRC also asserts that if any existing TV studio-transmitter link (STL) or TV relay link[35] is converted from analog to multiplexed digital/analog operation and is approved by a local coordinating body, that conversion should be treated as a minor modification. MRC recommends that existing inefficient analog receivers not be protected from converting grandfathered links. Specifically, MRC recommends that, if a grandfathered link converting from analog to multiplexed analog/digital operation would cause harmful interference to an analog receiver with a 3 dB bandwidth greater than 30 MHz, that receiver would be required to be upgraded. Finally, MRC recommends that the 1990-2110 MHz and 2450-2483.5 MHz bands be made available for use by Remote Pickup BAS as well as mobile TV BAS operations currently occupying the spectrum. and that fixed operations in these bands be phased out over time, in favor of mobile use of the spectrum, which MRC believes is more appropriate. In order to encourage the migration of point-to-point fixed links out of these bands, MRC recommends that new point-to-point fixed links with path lengths less than 17 km not be permitted and that existing such links be phased out of these bands within five years.[36]

25. ***Discussion.*** We find that adopting the proposals set forth in the ***Notice*** will enhance the reliability of fixed links for the BAS in Part 74 and the CARS in Part 78. Adopting the same equation for fixed operations in each of these rule parts will treat similar stations in a comparable manner, simplify station coordination in shared frequency bands, and reduce the potential of harmful interference occurring among stations authorized under different rule parts. Accordingly, we are modifying our rules to implement in Sections 74.644 and 78.108 the same equation codified at Section 101.143 for determining the maximum EIRP for path lengths shorter than the specified minimum. Further, we are grandfathering existing fixed links that are less than 17 km in length in the 2450-2483.5 MHz band. However, we will not permit grandfathered or other existing links that are modifying from analog operation to analog/digital or digital operation, to retain grandfathered status. and thus continue operation at their current elevated power levels, or he treated as minor modifications, even if operation is

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[33] *See* SBE Comments at 4-5; Comsearch Comments at 2-3; APTS/PBS Comments at 3; MSTVMAB Comments at 6; MRC Comments at 7; TIA Reply Comments at 2.

[34] SBE Comments at 4-5; MRC Comments at 7.

[35] Section 74.601 defines a TV STL station (studio-transmitter link) as a fixed station used for the transmission of TV program material and related communications from the studio to the transmitter of a TV broadcast, Class A TV, or low power TV station, or for other purposes as authorized in § 74.631. Section 74.601 defines a TV relay station as a fixed station used for transmission of TV program material and related communications for use by TV broadcast, Class A TV, and low power TV stations, of for other purposes as authorized in § 74.631. 47 C.F.R. § 74.601

[36] MRC Comments at 7

interference-free or is frequency coordinated, unless operation at the higher power levels is justified. Such continuation would otherwise ignore the existing requirement in Sections 74.644 and 78.108(c) that power in excess of that specified be justified by an appropriate technical showing," and could lead to the continuation of unnecessarily excessive power levels, thus defeating the spectral efficiency intended by minimum path length requirements. We decline to classify the conversion from analog to analog/digital or digital operation as a minor modification, as recommended by MRC. For reasons explained in detail in III.A.4, III.A.7, and III.C.2 below, such a change is and will remain classified as major under Section 1.929.[38] Further, while operation without interference is possible, and frequency coordination may demonstrate the ability of the system to operate without interference, neither would necessarily justify the continuation of higher power levels, or thus warrant the continuation. We therefore decline to accept such conditions as sufficient justification to warrant the continuation of higher power levels, and will continue to require an appropriate technical showing justifying the elevated power, as required by Section 74.644. With respect to MRC's recommendation to require upgrade of old analog receivers to avert harmful interference from a system converting to multiplexed analoddigital operation, we decline to impose such an upgrade, as our rules do not contain minimum receiver performance requirements.

26. Finally, we decline to designate the 1990-2110 MHz and 2450-2483.5 MHz bands for use by Remote Pickup **BAS** operations as requested by MRC. MRC does not provide justification or elaboration for this proposal, no other commenters support it, and, moreover, it is outside the scope of this proceeding. We also decline to phase out fixed operation in these bands. to prohibit new fixed path lengths shorter than 17 km in these bands, or to phase out existing short paths in these bands in five years. We recognize that it is possible that the removal of fixed paths could free up spectrum for mobile use in some areas. However, we find that such action would unnecessarily limit the flexibility of TV BAS to accommodate fixed paths, where such paths are feasible and desirable with respect to mobile use of the band. This is particularly true for short paths, whose reduced ETRP can accommodate them in a spectrally efficient way. Moreover, the forced relocation of existing fixed links would be a burden on licensees. Finally, no commenters from the BAS community that would be affected by **MRC's** proposed curtailments support them. We thus find their adoption unwarranted.

3. Transmitter Power

27. Currently, Sections 74.636 and 74.534 of the Commission's rules specify the power limitations for TV and aural BAS operations. respectively.'" For some frequency bands, only transmitter output power is specified, and for other bands. both transmitter output power and EIRP, which describes the amount of energy that is actually being radiated by the transmitting antenna: are specified." In the

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[37] Sections 74.644(c) and 78.108(c) state that upon appropriate technical showing, applicants and licensees unable to meet the minimum path length requirement may be granted an exception to the EIRP reduction requirements. ***See*** 47 C.F.R. §§ 74.644(c), 78.108(c). For example, operation through a passive repeater, where the path of the transmitted signal comprises two segments. one before and one after the repeater, may necessitate that the EIRP on a shorter first segment be elevated to ensure that the signal will, after propagating over both segments. be sufficient for reliable reception at the final receive antenna.

[38] *41* C.F.R.§ 1.929

[39] 47 C.F.R. §§ 74.534, 74.636. We note that it is common for a single transmitter to be certificated for use in Parts 74, 78, and 101 and Sections 74.534 and 74.636.

[40] 47 C.F.R. §§ 74.636 and 74.534 For example. Section 74.636 specifies a maximum allowable transmitter power of 20.0 watts for fixed TV **BAS** operations in the 1990-2110 MHz band, bur does not specify a maximum allowable (continucd....)

Notice, the Commission proposed to modify the BAS rules to specify only EIRP values for all aural and TV BAS frequency bands. It proposed to conform EIRP limitations on BAS and CARS operations with those for FS operations in bands where operation is similar, and to specify EIRP limitations on mobile BAS and CARS operations based on existing maximum transmitter power and typical antenna gain. Specifically, the Commission proposed that: (a) aural BAS operations in the 944-952 MHz band be limited to a maximum EIRP of 40 dBW; (b) fixed operations for TV BAS in the 1990-2110 MHz and 2450-2500 MHz bands be limited to a maximum EIRP of 45 dBW; and (c) mobile operations for TV BAS in those same bands and CAKS operations in the 1990-2110 MHz band be limited to a maximum EIRP of 35 dBW. The Commission sought comment on whether the 50 dBW EIRP limit on FS operations in the 12,700-13,250 MHz band should be increased to conform with the 55 dBW limit on BAS and CARS operations in that band. It also sought comment on whether different power standards should be adopted for digital and analog equipment. The Commission also requested comment as to whether it should remove the specifications for transmitter output power from the BAS rules consistent with the Part 101 approach."[41]

28. Most parties generally support the proposals set forth in the *Notice*.[42] Comsearch states that it agrees with harmonizing the power limits among **Parts** 74, 78, and 101 and expressing power limits in terms of maximum permitted ETRP. However, Comsearch states that it believes that multichannel video transmission under Parts 74 and 78 do not require higher EIRP than systems under Part 101 in the 12,700-13,250 MHz band. It recommends that the Part 101 EIRP limit of 50 dBW be conformed to the higher 85 dBW limit for this band in Parts 74 and 78, if future licensing is permitted under Part 101 in that band."[43] MRC states that it supports the proposed maximum EIRP of 38 dBW for mobile TV BAS operations in the 2 GHz and 2.5 GHz bands because that EIRP is representative of current ENG systems. MRC also supports specifying EIRP rather than output power because specifying EIRP would facilitate designing more practical systems and reduce the need to mount transmitters close to antennas.[44] Globalstar USA, Inc. and Globalstar, L.P. (Globalstar) urge the Commission to correct its terminology and proposed tables to specify the 2450-2483.5 MHz, rather than the 2450-2500 MHz, band, since the 2483.5-2500 MHz band is no longer available to new BAS stations."[45]

29. SBE agrees with the proposal to eliminate transmitter output power limits in favor of EIRP limits for fixed links. because it would allow a licensee the option of installing a high power transmitter to overcome prohibitive waveguide losses on a tall tower. However, SBE opposes eliminating output power limits for TV Pickup stations because the lack of antenna standards for these stations would pose an interference threat to other users. SBE concurs with the proposed EIRP limits for 950 MHz Aural BAS fixed links and 2 and 2.5 GHz fixed links. SBE opposes lower EIRP limits for digitally modulated systems than for analog modulated systems because they may operate in interference-

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EIRP In contrast, this rule Section specifies a maximum allowable output power of 20 watts and a maximum allowable EIRP of 55 dBW for fixed TV BAS operations in the 6875-7125 MHz band.

[41] *Notice* at ¶¶ 18-24,

[42] *See* APTS/PBS Comments at 3; MSTV/NAB Comments at 6; MRC Comments at 8; TIA Reply Comments at 3

[43] Comscarch Comments at 3-4. Comsearch explains that multichannel video systems typically use much lower EIRP levels than single channel transmission systems because of linearity issues within the transmission system.

[44] MKC Comments at 8.

[45] Globalstar Comments at 3.

limited markets where a lower maximum EIRP could result in more susceptibility to interference from higher EIRP analog paths.[46] SBE also opposes Globalstar's recommendation that only the 2450-2483.5 MHz band be specified as available for BAS operations. SBE notes that BAS stations at 2483.5-2500 MHz band were grandfathered by the *Report and* ***Order*** in Gen. Docket 84-690.[47]

30. Discussion. We find that the proposals to harmonize power limits among Parts 74, 78, and 101, and to express those limits as maximum EIRPs will provide consistency and promote greater efficiency in our rules. Accordingly, we are adopting our proposals and are specifying the following EIRP limits: (a) for aural BAS operations in the 944-952 MHz band, 40 dBW; (b) for fixed operations for TV BAS in the 1990-2110 MHz and 2450-2483.5 MHz bands. 45 dBW; and (c) for mobile operations for TV **BAS** in the 1990-2110 MHz and 2450-2483.5 MHz bands and CARS operations in the 1990-2110 MHz band, 35 dBW. We are also deleting output power limitations for fixed systems as it will permit flexibility in designing systems. However, we will maintain output power limitations in the rules for mobile systems. Maintaining thcse limits will reduce the potential for interference from mobile systems because they limit EIRP for omnidirectional mobile systems and reduce off-axis EIRP for directional mobile systems.

3 I. As noted above, Comsearch **asks** that the Part 101 EIRP limit for the 12,200-13,250 MHz hand be amended from 50 dBW to conform to the Parts 74 and 78 limit of *55* dBW. We generally agree. **As** stated throughout this proceeding, we believe that providing common technical standards for similar stations simplifies the manufacturing and licensing process. We note however, that except for LTTS, fixed stations under Part 101 have not been eligible for new licenses in the 12,700-13,200 MHz portion of the band since 1983.[48] These stations were designed and have been operating for the last 19 years or more with the 50 dBW limit. Thus, we see no reason to modify that limit for these stations. We will increase the EIRP limit to 55 dBW for all FS stations in the 13,200-13,250 MHz portion of the band. Further, we note that the rules for common carriers in the LTTS specify that they are subject to the technical rules of Parts 74 and 78[49] in certain frequency bands shared with BAS and CARS. Therefore, they also will be subject to the higher 55 dBW limit we are adopting for fixed stations. To avoid confusion in the rules, we will amend Section 101.807 to clearly state that LTTS stations in certain bands shared with BAS and CARS should follow the power rules of Parts 74 and 78.[50]

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[46] SBE Comments at 5-6.

[47] SBE Reply Comments at 4. ***See*** *also* In the Matter of Amendment of the Commission's Rules to Allocate Spectrum for, and to Establish other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, FCC 85-388, Gen. Docket No. 84-689, RM-4426; Policies and Procedures for Licensing of Space and Earth Stations in the Radiodetermination Satellite Service, Gen. Docket No. 84-690; Application of Geostar Corporation For Authority to Construct, Launch and Operate Space Stations in the Radiodetermination Satellite Service, File Nos. 2 191-DSS-PiL-83, 2192-DSS-P/L-83, 2193-DSS-P/L-83, 2194-DSS-P/L-83; a Request to Allocate the 1606.8-1613.8 MHz band **on** a Primary Basis to the Radio Astronomy Service, RM-4839; ***Report and Order, 50*** FR 39101 (Sep.27, 1985), at ¶¶ 18-19.

[48] *See* 47 C.F.R. § 101.147(a), note 22 which prohibits new permanent fixed point-to-point facilities in the 12.7-13.2 *GHz* band.

[49] 47 C.F.R. 101.803(b)

[50] We will also update the references in Section 101.803(b) to Sections 78.18(a)(7) and (a)(8), to conform with their redesignation as Sections 78.18(a)(6) and (a)(7). ***See*** In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz (continued....)

32. We further find that maintaining the same EIRP limits for digital and analog systems is appropriate because. although digital systems would normally require less EIRP to operate, lowering their maximum EIRP could render them more susceptible to interference from higher powered analog systems. Finally, regarding BAS station operations at 2483.5-2500 MHz, we agree with Globalstar that the new EIRP limits should not apply to grandfathered systems. Accordingly, in the final rules set forth in Appendix **A,** we are specifying that only the 2450-2483.5 MHz band is available for BAS stations. We note, however, that this action in no way affects the continued rights of grandfathered **BAS** stations in the 2483.5-2500 MHz band, as described in footnote NG147 of the Table of Frequency Allocations.[51]

4. Emission **Masks**

33. Emission masks serve to maximize spectrum efficiency by permitting reasonable and practical information transfer within a channel and at the same time limiting out-of-band emissions to minimize adjacent channel interference. Our rules contain a number of emission masks tailored to specific operations and channel sizes. For example, different emission masks are authorized under Parts 74. 78, and 101.[52] Although the same equipment is often certified and used by licensees in different services, our rules. in some cases, allow each service to use a different emission mask for the same type of emission (*e.g.*, FM, AM, *etc.*) in the same frequency band." The Commission in the *Notice* proposed to make the FM and digital modulation emission mask requirements for BAS consistent with the requirements for FS in Part 101 and proposed to adopt standard measurement procedures to measure emissions. Additionally, the Commission proposed to grandfather existing equipment authorized pursuant to current emission masks. Specifically, the ***Norice*** proposed the following:

TV BAS

- For **FM** modulation in all TV **BAS** frequency bands, to eliminate the FM emission mask of Section 74.637(a) and to apply the **FM** emission mask of Section 74.637(c)(1) (same **as** Section 101.111(a)(1)).[54] The emission mask in paragraph (c)(1) would provide equipment manufacturers more flexibility in the design of equipment because it permits the out-of-band emissions to be attenuated at a slightly slower rate. Such flexibility can be gained without compromising the interference potential of these transmitters because we believe that the specified attenuation is sufficient to protect adjacent channel operations;

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Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services. *Second Report and Order, Order or Reconsideration, and Fifth Notice of* ***Proposed*** *Rulemaking*, CC Docker No. 92-297, 12 FCC Rcd 12545 (FCC 97-82) (1997). at ¶ 104 and Appendix **A.** Final Rules.

[51] 47 C.F.R. § 2.106.

[52] 47 C.F.R. §§ 74.462, 74.535, 74.637, 78.103, and 101.111

[53] We note that it is common for a single transmitter to be certificated for use in Parts 74, 78, and 101

[54] The FM emission mask specified in Sections 74.637(a) and 74.637(c)(1) differs slightly in the attenuation schedules they specify. The emission mask of paragraph (a) specifies attenuations of 25 dB, 35 dB, and 43+10 Log(Power) dB on frequencies removed from the assigned Frequency by more than 50% and up to 100%, by more than 100% and up to 150%, and by more than 150%. respectively. The emission mask of paragraph (c)(1) specifies the same attenuations. but the corresponding frequencies on which they apply are those removed From the assigned frequency by more than 50% and up to 100%, by more than 100% and up to 250%, and by more than 250%. respectively. Also, the emission mask of paragraph (c)(1) specifies that attenuations of greater than 80 dB are not required.

- For digital modulation in TV BAS frequency bands above 15 GHz , to apply the emission mask for digital modulation in Section 74.637(c)(2) (same as Section 101.111(a)(2)(ii)) (no change from current rules);
- For digital modulation in all TV BAS frequency bands below I5 GHz. Io apply the emission mask for digital modulation in Section 101.111(a)(2)(i);
- For vestigial sideband amplitude modulation in all TV BAS frequency bands, to apply the emission mask for vestigial sideband amplitude modulation in Section 74.637(c)(3) (no change from current rules): and
- For all other types of modulation in all **TV** BAS frequency bands, to apply the emission mask of Section 74.637(b) (no change from current rules).

Aural BAS

- For FM modulation in all aural BAS frequency bands, to eliminate the FM emission mask of Section 74.535(a) and to apply the FM emission mask of Section 74.535(e)(1) (same **as** Section 101.111(a)(1)). **As** with the choice of emission mask for TV BAS. the emission mask of paragraph (e)(1) would provide equipment manufactures more flexibility in equipment design than the emission mask of paragraph (a);
- For digital modulation in aural BAS frequency bands above 1 S GHz. to apply the emission mask for digital modulation in Section 74.535(e)(2) (same as Section 101.111(a)(2)(ii)) (no change from current rules);
- For digital modulation in aural BAS frequency bands below 15 GHz, to apply the emission mask for digital modulation in Section 101.111(a)(2)(i); and
- For all other types of modulation in all aural **BAS** frequency hands, to apply the emission mask of Section 74.535(b) (no change from current rules)."

34. We also sought comment on the proper emission mask to apply to equipment that multiplexes both analog and digital signals for transmission over a single channel." Such operation complicates the equipment certification process because the emission masks are referenced to either analog or digital modulation techniques, but not both. We proposed to adopt for **BAS,** the same rule used under Part 101;[57] that is a transminer is considered to be using digital modulation techniques, and must meet those emission requirements, when digital modulation occupies 50% or more of the total peak frequency deviation of a transmitted radio frequency carrier." Another issue we sought comment on involved the characterization of analoddigital multiplexed transmitters with respect to the assignment of emission designators. We proposed that hybrid radios that multiples analog and digital signals continue to use a single emission designator.[59] In making this proposal. we acknowledged that when using hybrid equipment, digital and analog emissions may exist side-by-side within a channel. However, we also stated that the ULS is not designed to capture multiple emissions within a channel when those emissions

[55] *Notice* at ¶¶ 27-32

[56] For example, as TV stations transition to DTV, they generally will maintain their existing analog station until such time that the DTV transition is complete. During the transition, these stations may transmit both analog and digital signals from remote locations back to the studio and over STLs, and these two signals may be multiplexed and transmitted over a common channel simultaneously.

[57] 47 C.F.R. § 101.141(b)

[58] Notice at ¶ 31

[59] *Id.* at ¶ 32.

only partially occupy the channel. However, we also stated that the information was indirectly available because ULS collects transmitter manufacturer and model number – interested parties could use this information to determine the emissions within a channel.

35. APTSIPBS support the proposals standardizing emission masks.[60] MSTV/NAB support the goal of conforming **BAS** emission mask with Part 101, but urge input from broadcasters and equipment manufacturers before finalizing rules for BAS FM emission masks with slower attenuation rates. MSTV/NAB further recommend that the Commission not adopt digital emission masks for the 2 GHz band until the industry has settled on a specific digital technology.[61] Red River Broadcast Co. LLC and KQDS Acquisition Corp. (Red River) support the rule revisions proposed for emission masks for BAS, but emphasize that existing equipment must be grandfathered indefinitely to avert a substantial economic impact on their operations.[62] SBE states that Part 74 and Part 101 emission masks should he consistent, but defers to equipment manufacturers regarding the specific emission masks that should be used.

36. One commenter, MRC, which manufactures a dual carrier digital/FM analog transmitter, provides extensive comment on emission masks for composite systems, such as its TwinStream radio.[63] MRC argues that its composite system is analogous to an analog/digital multiplexed system and as such should be treated similarly. It supports our proposal to require compliance with the digital emission mask when the digital modulation occupies 50% or more of the total peak deviation of a system carrying analog FM and digital signals multiplexed together and suggest that the same rule should apply to composite systems. Therefore, because the analog portion of the signal transmitted by the Twinstream radio occupies 60% of the channel,[64] they propose that only the FM emission mask of Section 74.637(c)(1) or Section 74.637(a) should apply.[65] Likewise, MRC also requests that ENG systems below 15 GHz that are selectable for either analog or digital modulation only meet the requirements of the FM emission mask of Section 74.637(a).[66]

37. MRC also comments on the appropriate emission mask to apply to ENG radios using Coded Orthogonal Frequency Division Multiplexing (COFDM).[67] They argue that the more flexible FM

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[60] APTS/PBS Comments at 4.

[61] MSTV/NAB Comments at 7

[62] Red River Comments at 1-1

[63] MRC's composite radio is sold as the TwinStream radio. This radio uses two separate carriers – one to transmit an analog NTSC signal (approximately 15 megahertz bandwidth) and one to transmit a digital ATSC signal (approximately 7.5 megahertz bandwidth). These carriers are offset from the center frequency of the channel and the analog and digital signals are transmitted side-by-side. ***See*** MRC Comments at 4-5; **MRC** Reply Comments at 3-4; MRC *Ex Parte* filing of April 3, 2002, at 2-5; and MRC *Ex Parre* filing of April 18,2002, at 2.

[64] The analog signal is approximately 15 megahertz wide and the channel is 25 megahertz wide; 15/25 = 0.6.

[65] MRC conrends. however. that the analog and digital portions of the TwinStream composite signal individually meet the existing FM (Section 74.637(a)) and digital (Section 101.111(a)(2)) emission masks. See *MRC Ex Parte* filing of April 3, 2002. at 2; MRC *Ex Parte* filing of April 18. 2002, at 2.

[66] MRC *Ex Parte* filing of April 3, 2002. at 5.

[67] Coded Orthogonal Frequency Division Multiplexing (COFDM) is a modulation scheme that divides a single digital signal across 1,000 or more signal carriers simultaneously (FDM). The signals are coded to take advantage of (continued....)

emission mask of Section 74.637(a) rather than the digital emission mask of Section 101.111(a)(2) should apply. The) claim that the more stringent digital mask would require COFDM ENG transmitters when using complex modulation methods for the individual carriers to operate at lower power levels to avoid intermodulation" products that exceed the mask." Thus, they state that they must reduce power, which reduces range, to operate in the linear region of the amplifier to meet the digital emission mask." MRC also claims that the same relief is needed for single-carrier digital systems at 2 GHz to accommodate the 12-17 megahertz bandwidth reductions required due to the reallocation of the 1990-2025 MHz band to MSS.

38. Many commenters also addressed the issue of the proper emission designator to apply to hybrid analog/digital systems. APTS/PBS assert that a dual emission designator should be used to characterize a hybrid analog/digital system." SBE agrees and observes that hybrid FM and digital video links clearly exhibit dual emissions. Therefore, they should be required to exhibit separate frequencies and emission designators for each emission, rather than using a single emission designator such as F9W.[72] In contrast, MRC supports the continued use of a single emission designator for multiplexed analog and digital signals because such a system multiplexes two baseband systems and transmits them using a single transmitter. Thus, MRC contends that a single emission designator is proper." SBE also asks the Commission to clarify the correct emission designator to apply to COFDM modulation."

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forward error correction techniques and are spaced at precise frequencies which prevents the demodulators from seeing frequencies other than their own (hence, onhogonal) so they do not interfere with each other.

[68] Intermodulation is the production of frequencies corresponding to the sum and difference frequencies of the fundamentals and/or harmonics which occurs when the frequencies are mixed in a nonlinear element of a system. Intermodulation products are characterized by their order, where the nth order products are generated by n iterations of frequencies. For example, for frequencies f1 and f2, the 2nd order products are: f2 +f1 and f2 - f1; and the 3rd order products are: 2f2 + f1, 2f2-f1, 2f1 + f2, and 2f1 - f2. In the case of COFDM, these intermodulation products could be generated due to interactions between any of the many carrier (fundamental) frequencies being used. Because each carrier must be located within the limits of the emission mask, 3rd order products may fall either within the emission mask or just outside of it. For example, if f2 is a frequency near the upper end of the emission mask, a 3rd order product of 2f2 – f1 is a higher frequency than f2 and may be outside of the emission mask.

[69] MRC *Ex Parte* filing of April 18, 2002. at 3

[70] *Id*

[71] APTS/PBS Comments at 4

[72] *See* 47 C.F.R. § 2.201. Emissions are designated according to their classification and necessary bandwidth. A minimum of three symbols are used to describe the basic characteristics of the radio emission. The first symbol designates the type of modulation. For example, "F" is used for frequency modulation. The second symbol designates the nature of the signal modulating the main carrier. For example, "7" is used for *two* or more channels containing quantized or digital information. The third symbol designates the type of information to be transmitted. For example, "F" is used for television (video) information. In the case above, the emission type F9W refers to modulation where the main carrier is frequency modulated. indicated by "F" as the first symbol; the signal modulating the main carrier is a composite of one or more channels containing quantized or digital modulation, together with one or more channels conraining analog information, indicated by "9" as the second symbol; and the type of information being transmitted is a combination of data, telephony (including sound broadcasting), and/or television (video). indicated by "W" in the third symbol.

[73] MRC Reply Comments at 2-3

[74] SBE Comments at 6-7.

Finally, MRC asks the Commission to consider eliminating the collection of emission types for digital systems because their emission type no longer serves a useful purpose as all digital signals exhibit similar emission spectra.[75]

39. ***Discussion.*** Commenters generally did not address our proposals to standardize the emission masks between Part 74 and Part 101. Most comments addressed nuances of the rules, such as how they apply to composite systems. On the specific emission masks proposed, the comments received were supportive. Only MSTV/NAB caution against adopting a digital emission mask for the 2 GHz band at this time due to the lack of standards among manufacturers. We are mindful of MSTV/NAB's concerns. However, we believe that maintaining the status quo in the 2 GHz band would harm the industry more than help it. By providing certainty to manufactures and users regarding equipment, we believe that the industry will be able to move forward and begin making wide scale use of digital equipment to increase spectral efficiency and to ensure that equipment is available for broadcasters as they transition to DTV. Accordingly, we adopt our proposals to amend the Pan 74 aural and TV BAS emission masks to make them consistent with the emission masks of Part 101. As stated in the *Notice*, imposing a single set of standards across shared frequency bands will simplify the manufacturing and equipment authorization processes. Additionally, consistent rules will provide a level of certainty to licensees regarding the expected RF environment. minimize the potential of harmful interference and simplify the frequency coordination process. In addition, we adopt our proposal to grandfather existing equipment. and will do so for existing equipment and equipment of current production lines authorized, via certification or verification pursuant to the current emission standards, up to two years after the adoption of this ***Reporr*** *and* ***Order.*** and for stations authorized to use such equipment pursuant to an application filed up to two years after the adoption of this *Report and* ***Order."*** However, any such non-conforming equipment replaced on or after two years after the adoption of this ***Reporr*** *and* ***Order*** must be replaced by conforming equipment.

40. MRC also asks that we allow COFDM ENG systems to use the analog FM emission mask rather than the more stringent digital mask. The basis of this request is MRC's claim that FCC rules limit the power amplifier's rated capacity, causing operation to occur in the non-linear region of the amplifier. They state that this produces intermodulation products that exceed the digital emission mask. We note that our rules limit the output power of mobile ENG systems. However there is no rule that restricts the ability of a manufacturer to design an amplifier that is linear up to the maximum output power. Further. the use of the analog emission mask would provide less adjacent channel protection than the digital emission mask and harm the ability of licensees to operate in a spectrally efficient manner. Accordingly. we deny MRC's request and will require COFDM systems to meet the emission limitations of the digital mask. We will grandfather existing equipment and equipment of current production lines for two years consistent with our decision above. Finally, we clarify that the correct emission type for COFDM is W7D.

41. MRC, the only commenter to address the issue of hybrid digital/analog systems, supports our proposal to apply the digital mask to such systems if the digital traffic is 50% or more of the total

[75] MRC Comments at 4-5.

[76] This is consistent with the grandfather provisions adopted in WT Docket No. 00-19 where the digital emission mask was modified. See Amendment of Pan 101 of the Commission's Rules to Streamline Processing of Microwave Applications in the Wireless Telecommunications Services, Telecommunications Industry Association Petition for Rulemaking, *Report and Order*, WT Docker No. 00-19 and RM-9418, (FCC 02-218) (rel. July 31,2002) at ¶ 48.

peak deviation." We will adopt this proposal. In addition, MRC raises questions regarding the treatment of composite digital/analog systems. Similar to hybrid systems, we will apply the appropriate analog or digital emission mask based on the percentage of the channel that carries a digital signal. Specifically, this percentage will be calculated as the system's digital necessary bandwidth divided by the aggregate necessary bandwidth.[78] For purposes of equipment authorization and licensing, the output power and EIRP of a composite system will be its aggregate output power and EIRP." Both composite and hybrid systems will ease the transition to DTV as they provide a migration path for licensees to transition from an analog NTSC signal to a dual analog/digital (NTSC/ATSC) signal, and eventually to only a digital signal. We believe that the procedures we are adopting will simplify and advance the transition to DTV while protecting the ability of coordinators to engineer systems.

42. Similar to their request for COFDM systems, MRC asks that we require selectable digital/analog ENG systems to meet only the analog emission mask. We decline this request. Because only one signal is being transmitted at a time. this system is neither a hybrid nor a composite. Thus, each emission must be assessed individually – analog emissions must meet the analog mask and digital emissions must meet the digital mask. We will grandfather existing equipment and equipment of current production lines consistent with our decision above.

43. Several commenters address the issue of appropriate emission designators for a hybrid analog/digital multiplexed signal. APTS/PBS and SBE ask that a hybrid system be characterized by a dual emission designator. MRC supports the continued use of a single emission designator for such systems. We agree. As MRC observes, a hybrid system multiplexes an analog and digital signal and transmits a single signal containing the two. Thus, in this case, because a single signal is being transmitted, we believe it to be appropriate that a single emission designator be used. We similarly believe that a single emission designator is appropriate for composite systems. This will conform the emission mask for hybrid and composite systems which will simplify manufacturing processes, equipment authorization, and licensing for these spectrally efficient systems. We are mindful of SBE and APTS/PBS's concerns that a single emission designator for these systems will complicate frequency coordination because coordinators will not know the exact operating parameters. However, we disagree. The ULS captures transmitter manufacturer and model number for BAS transmitters. Thus coordinators can use this information to determine the frequency offset, power, bandwidth, and other technical and operational details of the individual analog or digital channels of a particular system. Moreover, interference protection criteria for specific composite systems may be obtained from manufacturers, as they are for other systems.'"

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[77] For purposes of this discussion, we will refer to a system that frequency modulates a single RF carrier with digital and analog signals frequency-division-multiplexed in its baseband, resulting in a single distinct. symmetrical FM emission. as a "hybrid" analoddigital (or digital/analog) system. We will refer to a system that modulates two separate RF carriers with analog and digital signals resulting in two distinct emissions, one analog and the other digital, as a "composite" dual channel analog/digital (or digital/analog) system.

[78] This method is suggested by MRC's calculation that their composite signal as 68% analog. *See* MRC Comments at 4; MRC *Ex Parte* Filing of April 3, 2002, at 2-5.

[79] For example, a composite dual channel system comprising an analog channel of output power 27 dBm and a digital channel of output power 33 dBm would specify its aggregate output power as 34 dBm, representing the sum of the two powers.

[80] *See, e.g.*, MRC Reply Comments at 2-3. MRC provides C/I ratios required to protect MRC's composite dual channel analog/digital system from like systems and analog FM systems.

44. To determine the emission designator for a composite system, we will use the aggregate necessary bandwidth of the system, which is comprised of the analog necessary bandwidth, any hand between the analog and digital signals, and the digital necessary bandwidth.[81] The emission designator will also use the appropriate emission type, such as F9F or F9W,[82] indicating that the system accommodates at least one analog and at least one digital signal. We note that licensees who modify their equipment from an analog system to a cotnposite analog/digital system, must also modify their station authorization to show the new emission type using ULS.[83] Under the rules, such a change would be considered major and require a new frequency coordination.[84]

45. We did not receive any comments with regard to our proposals for standardized measurement procedures. We continue to believe that our procedures should ensure that all equipment is measured consistently. Therefore, for measuring compliance with the emission mask, for emissions removed from the center frequency by 250% of the emission bandwidth or less, we will permit a reduction of the measurement reference bandwidth below the mask reference bandwidth to a value not less than 1% of the emission bandwidth, or the next higher measurement bandwidth available.[85] This will allow for more accurate emissions measurements just outside the edge of the emission bandwidth, which might otherwise be blurred by the contribution of much greater emissions within the emission bandwidth. For measurements outside this range, we will use the International Telecommunication Union (ITU) guidelines of a 100 kHz resolution bandwidth for systems operating on frequencies below 1 GHz and a 1

[81] For example, a composite dual channel system comprising an analog channel of necessary bandwidth 17 MHz and a digital channel of necessary bandwidth 7 MHz, with a 1 MHz band separating the two channels, would specify its aggregate necessary bandwidth as 25 MHz, representing the sum of the bandwidths, *i.e.*, the bandwidth from the outer edge of the analog necessary bandwidth to the outer edge of the digital necessary bandwidth. The digital percentage of such a system would be calculated as the ratio of the system's digital necessary bandwidth, 7 MHz, divided by its aggregate necessary bandwidth, 25 MHz, or 7/25 • 100% = 28%. Since this system would be less than **50%** digital, it would be subject to the FM emission mask, not the digital emission mask.

[82] The appropriate emission type will always contain a "**9**" as the second symbol.

[83] For example, to modify from an analog FM video operation to a composite dual channel analog/digital video operation, an existing analog FM video authorization, bearing an emission type of F3F representing a single FM video channel, would have to be modified to show an emission designator such as F9F, representing accommodation of one or more analog channels and one or more digital channels (indicated by a *"9"* as the second symbol) transmitting video information (indicated by an "F" as the third symbol), or F9W, representing accommodation of one or more analog channels and one or more digital channels transmining a combination of video, data, or telephony information (indicated by a "W" as the third symbol). ***See*** 47 C.F.R. § 2.201. Whether the composite system were determined by the method described above **to** require adherence to the analog emission mask or to the digital emission mask, its emission type would nonetheless continue to represent its accommodation **of** both analog and digital channels (indicated by a *"9"* as the second symbol), not the accommodation of analog-only channels (which could be indicated by a "3" or an "8" as the second symbol), or digital-only channels (which could be indicated by a "1","2", or "7" as the second symbol).

[84] In the above example. the change in emission type from F3F to F9F or to F9W would, as any change in emission type, be classified as a major change under 47 C.F.R. § 1.929(d).

[85] This option may be especially useful where the mask reference bandwidth is less than or slightly greater than the necessary bandwidth of the transmitter. For example. in a case where the system is analog, and the mask reference bandwidth is thus 100 kHz, but the necessary bandwidth of the system is 80 kHz, the measurement bandwidth may be adjusted down to 1 kHz, which is the next higher measurement bandwidth above 1% of 80 kHz, or 0.80 kHz.

MHz resolution bandwidth for systems operating on frequencies above 1 GHz.[86] We realize that this may create a situation where the emissions mask reference bandwidth stated in the rule is less than the measurement resolution bandwidth.[87] If this occurs, there could be some blurring of spectral spikes that might otherwise be detected. We believe that the benefits of simplification and standardization outweigh the potential for such effects to result in interference to adjacent channels. Further, to protect adjacent channel operations, we will require that the emission mask attenuation requirement be corrected to decrease with the ratio of measurement resolution bandwidth io mask reference bandwidth, *i.e.*, by a factor of $10 \log_{10}(B_{res}/B_{ref})$, where B_{res} is the measurement resolution bandwidth and B_{ref} is the emissions mask reference bandwidth in the rule.[88] Finally, we note that the analog FM emission mask does not specify a mask reference bandwidth, which, in conjunction with the measurement resolution bandwidth, could be used to calculate the correction. However. it is the policy of the Commission's Laboratory Division. which approves equipment authorizations. to require the use of a mask reference bandwidth of 100 kHz for this mask. Accordingly. we are therefore amending the analog FM emission mask for Part 74 TV and aural BAS to reflect a 100 kHz emission mask reference bandwidth.

5. Automatic Transmit **Power** Control

46. Automatic transmit power control (ATPC), is a function that provides for more efficient spectrum use by ensuring that the transmitter only uses the power necessary to maintain reliable communications. Radios that use ATPC operate with certain power levels during normal propagation conditions. When the receiver detects a drop in received signal level, due to multipath[89] or a rain fade, for example, the receiver sends a signal to the transmitter *to* gradually increase power. When the received signal level begins to rise. the receiver sends a signal to the transmitter to reduce power. By operating in this manner, interference levels into nearby microwave paths are reduced and more frequencies can be coordinated and used in any given geographic area. Additionally, by keeping signal levels low, ATPC reduces power consumption of the radio, which lowers operating costs and increases equipment reliability. The Commission proposed in the ***Norice*** that TV BAS, aural BAS, and CARS licensees be permitted to use ATPC.

47. Commenting parties strongly support the ATPC proposal set forth in the *Notice*.[90] Comsearch states that ATPC should be allowed for digital **BAS** and CARS microwave systems because it is commonly used and simplifies frequency coordination. It recommends that ATPC use be coordinated

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[86] See International Telecommunication Union (ITU) Radio Regulations. Appendix 3, Table *of* Maximum Permitted Spurious Emission Power Levels, at 10; ITU Recommendation ITU-R SM.329-9, Spurious Emissions, at 4.1 and at Annex 2, 1.1.2.

[87] For example, for a digital system operating below 15 GHz, the emissions mask reference bandwidth stated in the rule is 4 kHz. less than the measurement resolution bandwidths of 1 MHz for frequencies above 1 GHz and 100 kHz for frequencies below 1 GHz.

[88] Using a wider resolution bandwidth allows more energy to enter the measurement device. Thus, the displayed signal will generally appear at a higher level that it otherwise would.

[89] Multipath is a propagation phenomenon that results in radio signals reaching the receiving antenna **by** two or more paths. Causes of multipath include reflection from terrestrial objects, such as mountains and buildings.

[90] See APTSiPBS Comments at 5; MSTV/NAB Comments at 8: Comsearch Comments at 4: MRC Comments at 8; TIA Reply Comments at 3.

in accordance with the procedures of TIA TSB IO-F." "Interference Criteria for Microwave Systems."" TIA supports this recommendation.[93]

48. *Discussion.* As proposed in the *Norice,* we will permit TV BAS, aural BAS, and CARS licensees Io use ATPC and, as suggested by commenters. we encourage using **TIA TSB** 10-F guidelines. While the benefits of using ATPC for BAS may not be as great in other services because BAS generally uses one-way, rather than two-way. communications, the benefits can still be significant. For those stations using two-way communications, ATPC will permit more systems to be frequency coordinated, thus promoting the maximum utilization of spectrum. With respect to TIA TSB IO-F, we recognize the value of standardized, industry-wide frequency coordination guidelines, and address this issue in Section III.A.7 below.

6. Interference **to** Geostationary Satellites

49. In 1987, the Commission adopted rules to implement Article 27 of the ITU Radio Regulations,[94] which specifies ETRP limits and antenna pointing parameters for fixed terrestrial stations that share frequency bands with fixed satellite uplink (Earth-to-space) stations." These limits are designed to protect geostationary satellites from interference by limiting the amount of RF radiation that a terrestrial system can transmit directly towards a satellite. Since adoption of these rules, additional frequency bands have been allocated for satellite use and the Radio Regulations have been updated accordingly.

50. Because these rules are subject to international agreement, maintaining them in multiple rule parts is cumbersome and has led to varying requirements in Parts 74, 78, and 101. To remedy this situation, the Commission proposed to simplify the organization of the geostationary satellite protection rules by eliminating duplicative rule sections. Therefore, the ***Norice*** proposed that the technical rules for protecting geostationary satellites from interference from terrestrial systems be maintained in Part 101, and that Parts 74 and 78 merely state that licensees must comply with the geostationary satellites protection rules contained in Part 101.

51. **All** parties commenting on this issue strongly support the Commission's proposals to consolidate and reference in Part 101 existing Parts 74 and 78 rules limiting RF radiation directed toward geostationary satellites.[96] Comscarch also recommends the deletion of Section 78.105(a)(4), which it contends, is redundant with Section 78.106 because both sections address antenna restrictions regarding the geostationary satellite orbit (GSO).

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[91] *Interference Criteria for Microwave Systems*, Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB IO-F, dated June 1, 1994, available on line from the **TIA** at \ru?u.tiaonline.org.

[42] Comsearch Comments at **4.**

[93] TIA Reply Comments at 3.

[94] Under the revised numbering scheme for the Radio Regulations. these regulations are now contained in Article 21

[95] ***See*** Establishment of a Spectrum Utilization Policy for the Fixed and Mobile Services Use of Certain Bands Between 947 MHz and 40 GHz, Cen. Docket No. 82-334, ***Third Reporr And Order,*** 2 FCC Rcd 1050 (1987).

[96] *See* APTS/PBS Comments at 5; MSTV/NAB Comments at **9;** Cornsearch Comments at 4; **NSMA** Comments at 2; TIA Reply Comments at 3.

52. *Discussion.* We are adopting our proposal to consolidate in Part 101 any Parts 74 and 78 technical rules that pertain to protecting geostationary satellites from interference from terrestrial systems. This action will decrease redundancy in our rules and ensure that future changes to GSO protection requirements are consistent across affected services. In this connection. we will update the frequencies listed in Section 101.145(b) and (c) to encompass the BAS and CARS bands subject to RF radiation limits directed towards satellites. We note that this will result in the addition of the frequency band 6875-7075 MHz to Section 101.145(b) and the frequency band 12.75-13.25 GHz to Section 101.145(c). Additionally. as suggested by Cornsearch, we are deleting Section 78.105(a)(4), which restricts CARS antenna orientation to prevent interference to GSO satellites in the 12.70-12.75 GHz band, as these protections are redundant with those afforded by Section 78.106(b) for the larger 12.70-13.25 GHz band.

7. Frequency Coordination

53. Currently, Parts 74 and 78 of the Commission's rules for TV BAS and CARS require that the frequency coordination procedures of Part 101 be used for assignments in the 6425-6525 MHz and 17.7-19.7 GHz bands.[97] The Part 101 procedures generally require parties to coordinate their planned spectrum use with potentially affected parties prior to filing a license application. Additionally, the TV BAS and CARS rules specify identical interference protection criteria for the 12,700-13,250 MHz band. Such rules are necessary to promote spectrum efficiency and to minimize the potential for any system to cause harmful interference to other systems in the same frequency band. In the *Part 101* ***Order.*** the Commission amended its rules to conform the frequency coordination procedures for microwave systems to TIA industry standards and to apply these standards to all microwave bands.[98]

54. In the *Notice*, the Commission proposed to require that all prospective applicants in frequency bands above 1990 MHz for TV BAS and CARS coordinate their planned spectrum use prior to filing applications, using the procedures of Section 101.103(d). Further, in order that applicants and licensees can easily locate the coordination rules, the ***Norice*** proposed to amend Section 78.36 to mirror the Part 101 coordination rules. The ***Norice*** requested that commenters address whether a frequency coordination requirement should be imposed uniformly across the United States or only applied to the most heavily congested markets. Additionally. the *Notice* requested comment on whether aural BAS stations operating above 944 MHz should also adhere to the procedures of Section 101.103(d).[99]

55. Comments were mixed on the proposals set forth in the ***Norice.*** A number of parties support using Scction 101.103(d) procedures.[100] while SBE and Viacom oppose using those procedures.[101] APTS/PBS support these procedures and assert that prior coordination should be required uniformly across the U.S.[102] MSTV/NAB support Scction 101.103(d) procedures for fixed operations,

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[97] 47 C.F.R. §§ 74.638 and 78.36.

[98] *See Purl 101* ***Order. supra,*** at 13.486

[99] *Notice* at ¶¶ 38-40

[100] *See* APTS/PBS Comments at 5-6; MSTV/NAB Comments *at* 7: Cornsearch Comments at 5; MRC Comments *at* 3-4: NSMA Comments at 2; **TIA** Reply Comments at 3.

[101] ***See*** SBE Comments at 8-9; Viacom Reply Comments ai 2.

[102] APTSIPBS Comments at 5-6.

but contend that TV pick-up for ENG should follow existing ad-hoc, local frequency coordination procedures. which permit frequency coordination on a near real time basis.[103] NSMA supports Section 101.103(d) coordination as proposed, arguing that that it works well to protect both terrestrial and satellite communications. NSMA urges that the 12.7-13.25 GHz band be included in these requirements.[104]

56. SBE opposes the adoption of Section 101.103(d) coordination procedures for BAS in the 950 MHz, 2 GHz, 2.5 GHz, 7 GHz, and 13 GHz bands, asserting that the Part 101 process would be unnecessarily complex and burdensome. It favors rules that keep the existing less formal BAS frequency coordination procedures, but would add a requirement that applicants provide evidence of frequency coordination for fixed point-to-point systems.[105] In this connection, SBE recommends interference ratios and criteria for use in frequency coordination.[106] SBE expresses particular concern that frequency coordinators will not take into account patterns of mobile use, with the result that mobile use may be disrupted by new fixed facilities. Further. SBE asserts that because ENG operations are generally coordinated in real time or near real time, formal Section 101.103(d) procedures would not work.[107] Viacom agrees with SBE in opposing the adoption of Part 101 prior coordination procedures for BAS.[108]

57. KNME-TV (KNME) supports the proposed adoption of Part 101 prior coordination procedures for all TV BAS stations to prevent interference and abuse. It contends that a lack of frequency coordination has resulted in widespread abuse and a general disregard of the voluntary process. KNME recommends that frequency coordination be imposed uniformly across the country, including rural areas.[109]

58. MRC supports prior coordination for fixed links, but argues that non-fixed links should be exempted in favor of the existing local frequency coordination process, which it contends is working well. MRC also supports the adoption, for BAS. of criteria in Section 101.105(c) and consequently TIA TSB 10-F, which provide guidelines for applying and developing interference protection criteria, because they are consistent with the existing Section 74.638 in establishing a minimum adjacent channel interference C/I ratio of 56 dB. MRC states that this ratio exceeds the ratio required by MRC's Twinstream radio.[110]

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[103] MSTV/NAB Comments at 7-8

[104] NSMA Commcnts at 2-3

[105] SBE Commcnts at 8-9.

[106] SBE Comments at 1-2. SBE suggests a co-channel DIU ratio of 60 dB. or, alternatively, an undesired signal strength 10 dB below the noise threshold of the receiver, for any type of modulation, and adjacent channel D/U ratios of 10 dB or, alternatively, equipment tests, for digital into analog systems. and 0 dB for analog into analog systems.

[107] SBE Reply Comments at 5-7.

[108] Viacom Reply Comments at 2-3

[109] KNME Reply Comments at 1

[110] MRC Comments at 3-4. *See also* MRC Reply Comments at 2-3. MRC also notes that TIA TSB 10-F provides for the consideration of interference thresholds unique to the equipment and interference configuration, and, in this connection, provides detailed interference ratios needed to protect its TwinStream radio.

59. Globalstar urges the adoption of rules requiring coordination of BAS and **CARS** with non-geostationary satellite orbit (NGSO) MSS user uplinks allocated in the 2 GHz band and feeder downlinks proposed to be allocated under ET 98-142 in the 7 GHz band."[111] SBE calls Globalstar's proposals to protect NGSO MSS feeder downlinks from TV Pickup operation in the 7 GHz band premature because MSS feeder downlinks have not yet been allowed under ET Docket 98-142.[112]

60. *Discussion.* Based on the comments, we are adopting frequency coordination procedures for all TV and aural BAS and **CARS** frequency bands. The rules being adopted herein will require all fixed stations, except for those in the 1990-2110 MHz band, to use the frequency coordination procedures **of** Section 101.103(d). For mobile **BAS** and **CARS,** we will maintain the use of Section 101.103(d) procedures in those bands where it is currently required (*i.e.*, 6425-6525 MHz and 17.7-19.7 GHz)[113] and flexibly permit use of Section 101.103(d) or local coordination procedures for the 2450-2483.5 MHz, 6875-7125 MHz, and 12,700-13,250 MHz bands. For all other mobile **BAS** and **CARS** stations, we will continue to allow mobile stations to coordinate locally. In the 1990-2110 MHz band, we will maintain the current system which allows for local coordination of all stations. The rules will be applied uniformly across the United States for both urban and rural environments.[114]

61. We find that Section 101.103(d) prior coordination procedures are appropriate for fixed **BAS** and **CARS** applications. except as explained below for the 1990-2110 MHz band. Uniform procedures for bands shared among these services, are necessary to ensure as much protection as possible to stations while minimizing the possibility of stations to cause or receive harmful interference. SBE is concerned that fixed station coordinators will not take into account mobile station use, but we do not share this concern, To properly coordinate a station, frequency coordinators must incorporate and plan for mobile stations as well as other fixed stations. To do otherwise would ignore the operating environment and do a disservice to the coordinator's client, who could be at risk if mobile use patterns are not taken into account. We believe that the collective needs of the local **BAS** licensing community to deploy mobile as well as fixed operations in their community will ensure that mobile patterns of use are fully respected in the selection of fixed frequencies by frequency coordinators under contract to provide service to any prospective **BAS** licensee in that community. In this connection, we acknowledge the role local frequency coordinating bodies have played in maintaining order within the **BAS** bands and

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[111] Globalstar Comments at 3-7. *See* Amendment of Parts 2, 25 and 27 of the Commission's Rules with Regard to the Mobile-Satellite Service Above 1 GHz, *Notice of Proposed Rule Making*, ET Docket No. 98-142, 13 FCC Rcd 17107 (1998) (*MSS Notice*). *See also* Amendment of Parts 2. 25 and 27 of the Commission's Rules with Regard to the Mobile-Satellite Service Above 1 GHz, *Reporr and* ***Order,*** ET Docket No. 98-142, 17 FCC Rcd 2658 (2002) (***MSS Order).*** The *MSS* ***Order*** recently allocated the band 6700-7025 MHz for non-Federal Government FSS downlinks on a co-primary basis, limiting the use of this spectrum to NGSO MSS feeder downlinks. It also established limits on the power flux density produced by the NGSO MSS satellite at the surface of the earth, to protect terrestrial services; established frequency coordination procedures for the band 6700-6875 MHz using existing Pan 25 and 101 rules; and deferred coordination requirements between combined fixed and mobile terrestrial operations and satellite operations in the band 6875-7025 MHz band to **a** future proceeding. ***See*** *MSS* ***Order*** at ¶¶ 4. 39-60.

[112] SBE Reply Comntents at 1-2. We note that the *MSS* ***Order*** has recently allocated the band 6700-7025 MHz, as proposed in the *MSS Notice*, for non-Federal Government FSS downlinks on a co-primary basis, limiting the use of this spectrum to NGSO MSS feeder downlinks. ***See*** *MSS* ***Order*** at ¶ ***39.***

[113] 47 C.F.R. § 74.638(b).

[114] We note that **we** will reproduce the frequency coordination rules in Part 78 for CARS applicants and licensees

encourage licensees to continue consulting with thcse bodies as they pursue future licensing. SBE asks that if we implement thc Part 101 procedures for BAS. that we require notitication of applications to the national SBE Frequency Coordination Director. We decline to require this. We find that such a procedure could be overly burdensome to applicants and coordinators. Moreover, it is unnecessary, given the involvement of local frequency coordinating bodies in fixed frequency selection, and especially given that all applications accepted for filing are publicly available through the ULS. The public availability of filing information has worked well in informing FS frequency coordinators of current filings and we believe it will satisfy the needs of the national SBE Frequency Coordination Director without increasing the filing burden on applicants or coordinators.

62. With respect to mobile TV BAS/CARS applications, we find that Section 101.103(d) coordination procedures would be unnecessarily burdensome. Given the urgency of ENG operations, and the long history of successful real time frequency coordination provided hy local coordinators, we find that there is little potential that interference would result from its continued function without imposing the formality of Section 101.103(d) procedures. We therefore decline to adopt rules requiring Section 101.103(d) coordination procedures for mobile TV BAS/CARS stations for the 2 GHz, 2.5 GHz, 7 GHz, and 13 GHz bands. Licensees in these bands, except the 2 GHz band discussed below, will have the flexibility to exercise either Section 101.103(d) procedures or local coordination procedures, as appropriate to the situation. In the 6425-6525 MHz and 17,700-19,700 MHz bands. we maintain the existing rules requiring Section 101.103(d) coordination procedures for mobile **TV** BAS/CARS, as these bands are used heavily by FS services as well as BAS/CARS and subject to the same procedures. We believe that the use of the expeditious verbal notification and response procedures available in Section 101.103(d) has worked well in accommodating mobile users of all services in these shared bands, and to permit different or less formal procedures for BAS/CARS applicants would be inequitable and could lead to inconsistency and confusion in frequency coordination. A table summarizing the coordination requirements is provided below.

63. For the 1990-2110 MHz band, we will continue to maintain procedures which allow for local frequency coordination for all stations – fixed and mobile. In this band, we deviate from the policy articulated above for fixed stations based on unique circumstances of this band. Specifically, it is used predominantly by mobile TV pickup stations, but also supports some fixed links and it is currently transitioning to accommodate MSS in the 1990-2025 MHz portion of the band. Because each area of the United States may transition to MSS at different times, local frequency coordinators may be in the best position to accommodate requests to local operating conditions. We note that the use of a local coordinator is not mandated and licensees are free to coordinate stations themselves or by going to the coordinator of choice. SBE asks that under such a scheme, we require evidence of frequency coordination, similar to that required by the procedures of Section 101.103(d).[115] We agree with SBE that a method of verification is necessary. The rules of Section 101.103(d) have worked well in the past and we adopt a similar requirement here. Thus. we are adopting changes to Sections 74.638 and 78.36 which supplement local frequency coordination procedures for fixed systems to require the submission of a certification attesting that all co-channel and adjacent-channel licensees and applicants potentially affected by the proposed tixed use of the frequencies have been notified and are in agreement that the proposed facilities can be installed without causing harmful interference to other users. Finally, we do *not find it* necessary to require the submission of detailed engineering calculations, as suggested by SBE.[116] The accomplishment of such calculations is inherent to the frequency coordination process. In

[115] ***See*** SBE Comments at 9.

[116] *Id* **at 8**

this regard, we rely on coordinators to use good engineering judgment when coordinating systems and give deference to their recommendations. Requiring a detailed engineering submission such as that described is therefore unnecessary.

BAS/CARS Frequency Band	Frequency Coordination Procedures		
	Existing Requirements	New Requirements	
	Fixed and Mobile	Fixed	Mobile
2 GHz	Local	Local (no change)	Local (no change)
2.5 GHz	Local	Prior	Local or Prior
6.5 GHz	Prior	Prior (no change)	Prior (no change)
7 GHz	Local	Prior	Local or Prior
13 GHz	Interference Criteria	Prior	Local or Prior
18 GHz	Prior	Prior (no change)	Prior (no change)

64. An additional issue related to frequency coordination involves protection standards for stations. MRC asks that we adopt interference criteria for BAS coordination that is similar to the FS procedures in Sections 101.105(c) and 101.103(d). These criteria incorporate TIA TSB 10-F, or, alternatively, the exercise of good engineering practices or conservative default criteria. SBE, while not commenting directly on Section 101.105, recommends that coordinators be given flexibility regarding frequency coordination."[117] We note that the *Notice* discussed the importance of uniform frequency coordination procedures and standards to simplify coordination in shared bands and minimize the potential of stations causing interference.[118] In this regard, the procedures in Part 101 have served the FS well in the past, providing a firm and uniform, yet adaptable, basis for engineering systems without harmful interference, while maximizing frequency re-use. Thus. we believe that these same procedures will similarly benefit BAS and CARS. We note that these criteria are consistent with those already in effect for all BAS and CARS operations in the 12.7-13.25 GHz band."[119] We are therefore adopting Section 101.105 interference criteria for use where Section 101.103(d) frequency coordination procedures apply to BAS and CARS.

65. Finally, we decline to consider in this proceeding sharing issues and frequency coordination requirements between BAS/CARS and MSS. We acknowledge that new coordination procedures need to be developed for sharing between NGSO MSS user uplinks in the 7 GHz band and downlinks in the 7 GHz baud. and BAS and CARS operations. However, those issues will be addressed in a future proceeding."[120]

8. Frequency Tolerance

66. The *Notice* proposed to amend the frequency tolerance rules for TV BAS.[121] Specifically, consistent with the proposal made in the *Part 101 NPRM*,[122] the *Notice* proposed to eliminate separate

[117] See MRC Comments at 3-4; SBE Comments at 8

[118] *See Notice* at ¶¶ 37-39

[119] Sections 74.638, 78.36. 47 C.F.R. §§ 74.638, 78.36.

[120] *See MSS Order* at ¶¶ 4, 48-60.

[121] Frequency tolerance is the maximum permissible deviation of the center frequency of an emission from its assigned frequency.

frequency tolerance requirements tor base and mobile operations. Additionally, the *Notice* proposed to adopt a frequency tolerance of 0.001% for TV BAS equipment operating in the 2450-2483.5 MHz band. which does not have a limit under the current rules. Finally, the *Notice* proposed to grandfather existing authorized BAS systems in the 2483.5-2500 MHz band at their current frequency tolerance.[123]

67. Commenting parties support the proposals set forth in the *Notice*.[124] However, MRC notes that it currently manufactures TV BAS equipment with tolerances of 0.005% for fixed analog radios and 0.002% for portable analog radios, and states that all radios in the field **or** currently under production for existing product lines should be grandfathered.[125] Red River agrees that grandfathering is necessary, arguing that, if their existing equipment had to be replaced before its cost was fully amortized, and they would incur a substantial adverse economic impact."[126]

68. *Discussion.* As proposed in the *Notice*, we are eliminating separate frequency tolerance requirements for base and mobile operations, and are adopting a frequency tolerance of 0.001% for fixed and mobile TV BAS equipment operating in the 2450-2483.5 MHz band.[127] **We** find that having consistent frequency tolerance requirements for both fixed and mobile transmitters will simplify frequency coordination and improve spectrum efficiency. Similarly, by adopting a frequency tolerance requirement. we will ensure that spectrally efficient equipment is used and, for example, in the 2450-2483.5 MHz band, that the potential for adjacent channel interference is reduced. In that regard, to accommodate existing product lines in the 2450-2483.5 MHz band such as those of MRC, we will delay the effective date of the 0.001% tolerance in that band for two years. We find that this will accommodate **MRC's** existing product line, and strikes a balance between the benefits of spectrum efficiency afforded by a tighter tolerance and the indefinite accommodation sought by MRC for non-compliant product lines. Thus, we will grandfather existing equipment and equipment of current production lines exceeding the new 0.001% tolerance in the 2450-2483.5 MHz band and authorized, via certification or verification,[128] up to two years after the adoption of this ***Report and Order,*** and stations authorized to use such equipment pursuant to an application filed up to two years after the adoption of this ***Report and Order.*** However, any such non-conforming equipment replaced on or after two years after the adoption of this ***Report and Order*** must be replaced by conforming equipment.

(Continued from previous page)

[122] *See Part 101 NPRM*, *supra*, at Appendix D. Section 101.107.

[123] *Notice* at ¶ 41

[124] *See* APTS/PBS Comments at 6; MSTV/NAB Comments at 8: MRC Comments at 6; TIA Reply Comments at 4

[125] MRC Comments at 6.

[126] Red River Comments at 1-2

[127] See Appendix **A,** *infra*, at § 74.661

[128] We remind manufacturers that, although their equipment may meet new tolerance or emission mask requirements, their existing equipment verification may nor demonstrate, or their existing equipment certification may not reflect, such compliance. To remedy this situation. manufacturers must, in the case of verification, verify via retesting, or, in the case of certification, refile certification under the permissive change provisions of Section 2.1043 or file for certification under a new identification number, depending on the modifications needed to meet the new requirements 47 C.F.R. §§ 2.1043.

9. Use of the 13.150-13.2125 GHz Band by BAS and *CARS* Pickup Stations

69. In ET Docket No. 98-206, the Commission allocated the hand 12.75-13.25 GHz for Non-Geostationary Fixed Satellite Service (NGSO FSS) uplinks on a co-primary basis.[129] 'The 13.15-13.20 GHz portion of that band is currently used by TV BAS and CARS Pickup Stations within *50* km of the top 100 television markets and by fixed TV auxiliary stations in all other areas.'"[130] To protect these operations, the NGSO FSS systems were excluded from operating in the 13.15-13.2125 GHz band (channels A 19, A20, B19 and B20).[131] In the *NGSO* ***Order,*** the Commission expanded these exclusions in favor of TV BAS and CARS to include frequencies up to 13.2125 GHz and to extend to the entire United States. This action was predicated on the expectation that BAS and CARS mobile operations will be concentrated on those four channels.'"[132] Based on that action, the Commission proposed to update Section 74.602(a), Note 2 to reflect these changes. Further, the ***Norice*** proposed to grandfather all fixed stations that were licensed in the 13.15-13.2125 GHz hand prior to the effective date of the rules in the *NGSO* ***Order.'"***[133]

70. Both MSTV/NAB and SBE support our proposals.[134] SBE notes that, in light of the *NGSO* ***Order,*** it makes sense to extend the reservation and grandfather existing fixed BAS and CARS."'[135]

71. *Discussion.* As proposed in the ***Norice.*** we are updating Section 74.602(a) Note 2 to implement, in accordance with the *NGSO Order*. expansions in mobile TV BAS and CARS pickup stations' use ofthe 13.15-13.2125 GHz band and the exclusion of NGSO FSS from that band.[136] We note that the recent *Optel Order* has rendered BAS pickup stations primary, and CARS stations, secondary to **BAS** pickup stations. in the 13.20-13.25 GHz band,'" and we are updating Section 74.602(a), Note 2, accordingly, to reflect this status in the 13.20-13.2125 sub-band. Consistent with these actions, we are also updating Section 78.18(I) with respect to CARS, and footnote NG53 to the Table of Frequency

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[129] ***See*** Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency wirh GSO and Terrestrial Systems in the Ku-Band Frequency Range, ***First Reporr*** *and* ***Order and Further Notice of Proposed Rule*** *Making*, ET Docket No. 98-206, 16 FCC Rcd 4096 (2001) *(NGSO* ***Order).*** at ¶ 122

[130] 4 1 C.F.R. § 74.602(a) Note 2

[131] *Id.* We note that Note 2 currently specifies protection for the 13.15-13.20 GHz band. However, channel B20, which was provided protecrion in the *NGSO Order*. extends to 13.2125 GHz.

[132] *See NGSO* ***Order*** at ¶ 126.

[133] *Notice* at ¶ 42.

[134] *See* MSTV/NAB Comments at 9; SBE Commenrs at 11

[135] SBE Comments at 11

[136] We note that Skybridge L.L.C. has tiled a Petition for Reconsiderationof the Commission's decision in the *NGSO Order* to exclude NGSO FSS from the band 13.15-13.2125 GHz. That Petition is being addressed in ET Docket No. 98-206.

[137] *See* Amendment of Eligibility Requirements in Pari 78 Regarding 12 GHz Cable Television Relay Service, CS Docket No. 99-250, ***Report and Order,*** 17 FCC Rcd 9930 (2002) (FCC 02-149) (*Optel* ***Order),*** at ¶¶ 21-24. ***See*** *also* Section 78.18 (m). added by the *Optel* ***Order.*** which states that CARS stations may be authorized use of the band from 13.20 to 13.25 GHz on a secondary basis to Television Broadcast Auxiliary Stations. 47 C.F.R. § 78.18(m).

Allocations in Section 2.106. Further. we are grandfathering at their current status all fixed stations licensed in the 13.15-13.2125 GHz band prior to the effective date of the rules in this ***Reporr and Order.***

10. Use of the 31.0-31.3 GHz and 38.6-40.0 GHz Bands by the BAS and CARS

72. In 1997, the Cornmission redesignated the 31.0-31.3 GHz band for the Local Multipoint Distribution Service (LMDS) and deleted the designations for BAS and CARS."' Consequently, BAS and CARS are no longer authorized to operate in this band. However, many of the technical rules continue to mention this band. Therefore. the Commission proposed in the *Notice* to eliminate references to the 31.O-3l.3 GHz band in the aural BAS, TV BAS and CARS rules.[139]

73. Similarly, the Commission, in 1997, adopted rules and procedures to assign the 38.6-40.0 GHz band by competitive bidding."" That band had been available for assignment to mobile BAS and CARS licenses without bandwidth limitation and on a secondary basis to fixed stations.[141] In addition to the new assignment procedures. the Wireless Telecommunications Bureau, pursuant to delegated authority, adopted an ***Order (Freeze Order)*** announcing that the Commission would no longer accept for filing any new applications for 39 GHz licenses in the Common Carrier or Private Operational Fixed Point-to-Point Radio Services."" In addition, consistent with the policy of the ***Freeze Order*** and the assignment of new licenses by auction, no new assignments are being made for BAS or CARS licenses in the 38.6-40.0 GHz band."? Accordingly, the Commission proposed in the ***Notice*** to remove all references to the 38.6-40.0 GHz bands from the BAS and CARS rules. As a final matter, the Commission noted that there are 15 incumbent Television Pickup BAS stations operating in this band. In the ***Norice,*** the Commission stated that these BAS licensees may continue to operate under the parameters of their current licenses and renew those licenses in the future."'

74. Commenting parties generally support the proposals set forth in the *Notice*.[145] SBE states that it agrees with the proposed elimination *of* references to the 31.0-3 1.3 GHz and 38.6-40.0 GHz bands from BAS and CARS technical rules, since those bands are no longer available to BAS, and concurs with

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[138] ***See*** Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, To Reallocate the 29.5-30.0 GHz Frequency Rand, To Establish Rules and Policies for Local Multipoint Distribution Service and For Fixed Satellite Servicer, CC Docket No. 92-297, *Second* ***Report and Order, Order on*** *Reconsideration, and Fifth Norice of Proposed Rulemaking*, 12 FCC Rcd 12545 (1 997).

[139] *Notice* at ¶ 43

[140] *See* Amendment of the Commission's Rules Regarding The 37.0-38.6 GHz and 38.6-40.0 GHz Bands, ET Docket No. 95-183, ***Report and Order and Further*** *Norice* ***of Proposed*** *Rule* ***Making,*** 12 FCC Rcd 18600 (1997). In May 2000, the Commission assigned more than 2,000 licenses in 175 Economic Areas by Competitive bidding in the 39 GHz band. See 39 GHz Band Auction Closes. Report Auc-30-E (Auction No. 30), DA 00-1035. rel. May 10, 2000.

[141] 47 C.F.R. § 74.602

[142] *See* Petition For Amendment Of The Commission's Rules Regarding The 37.0-38.6 GHz And 38.6-40 GHz Bands. DA 95-2341, ***Order,*** 11 FCC Rcd 11S6 (1996) ***(Freeze Order).***

[143] No new BAS licenses have been issued in the 38.6-40.0 GHz band since the adoption ofthe ***Freeze Order.***

[144] *Notice* at ¶ 44. Since the adoption of the *Notice*, one station. call sign KC23 139, cancelled its license.

[145] *See* SBE Comments at 11; MSTV/NAB Comments at 9: Winstar Comments at 2.

the grandfathering of incumbents in the 38.6-40.0 GHz band. SBE also requests that the Commission provide guidance on how to identify. contact, and coordinate with the primary occupants of the band.[146]

75. Winstar states that it strongly supports the proposed elimination of references to the 31.0-31.3 GHz band from all BAS and CARS technical rules, as that band is currently designated for primary use by LMDS and there are no currently active BAS or CARS authorizations in the band.[147] Winstar states that it also supports the proposed elimination of references to the 38.6-40.0 GHz band from BAS and CARS frequency assignment rules, but suggests that the references to that band in certain BAS technical rules be maintained because those rules set technical limitations on incumbent operations in the band. Winstar also expresses concern with the *Notice*'s proposal to allow incumbent **BAS** licensees in the 38.6-40 GHz band to continue operating. It notes that, according to the ULS, the locations of the 16 active BAS licenses are in nine of the largest major metropolitan areas in the country.[148] Winstar strongly urges the Commission to clarify that all BAS operations in the 38.6-40.0 GHz band. which are secondary. must coordinate with primary fixed wireless licensees prior to each operation. with no exceptions for unanticipated need for immediate operation. Alternatively, Winstar recommends that the Commission eliminate secondary BAS licenses from the band, in order to avoid adversely impacting Winstar's service availability. Finally. Winstar urges the Commission to publicize the fact that information on all fixed wireless licenses in the band is available on the ULS to all incumbent **BAS** operators.[149]

76. *Discussion.* We are adopting the proposals in the ***Norice*** to eliminate references to the 31.0-31.3 **Gtlz** and 38.6-40.0 GHz bands from **BAS** and CARS technical rules, and to grandfather BAS incumbents in the 38.6-40.0 GHz band. No party opposes the first proposal, and only Winstar expresses concern regarding the second proposal. With respect to Winstar's concern, we note that the incumbent **HAS** licensees remain bound by the operational parameters specified on their current authorizations. We also clarify that, as stated in footnote US291 to the Table of Frequency Allocations, mobile **BAS** facilities in the 38.6-40.0 GHz hand operate on a secondary basis with respect to stations operating in accordance with the Table of Frequency Allocations, which include Winstar's operations under Part 101. In this connection, consistent with our actions removing references to the 38.6-40.0 GHz band from Part 74, we are deleting Auxiliary Broadcasting from that band in the Table of Frequency Allocations. We are also deleting footnote US291 from the Federal Government and Non-Federal Government columns of the table and replacing it with footnote NG175 in the Non-Federal Government column only, revised to show that the band is no longer available for BAS. and that incumbent mobile **BAS** operations licensed as of the effective date of the rules in this *Report and* ***Order*** are grandfathered and may continue to

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[146] SBE Comments at 11

[147] Winstar Comments at 2

[148] *Id.* at 3. With respect to Winstar's concern. in its Comments ar 3-4, that certain **BAS** licenses listed as active are also listed **as** expired on the ULS, we clarify thar, as noted by SBE in its Reply Comments at **8,** the expiration dates on BAS licenses may not be updated from the broadcast station renewal, so thar validity of a license must be determined by whether it is active on the ULS. Modifications to enable the ULS to update expiration dares from broadcast station renewals are planned. Meanwhile, active status may be determined through the ULS using the Frequency search function, or, if the call sign is known, observing its active status on the license record. Questions about specific licenses should be directed to the Licensing Branch of the Public Safety and Private Wireless Division of the Wireless Telecommunications Bureau in Gettysburg, Pennsylvania.

[149] *Id.* at 4-5

operate indefinitely on a secondary basis with respect to Part 101 licensees. We are revising Section 2.106. Table of Frequency Allocations. and Part 74 of our rules, accordingly.[150]

11. Antennas

77. In addition to the specific proposals made in the ***Nolice,*** we asked commenters to identify other rule changes that would benefit the BAS. In this regard, **MRC** requests that periscope antenna systems[151] be prohibited from BAS, as they are in other services,[152] because periscope antenna sidelobe rejection is poor and unpredictable, and can cause interference to both satellite and terrestrial systems.[153]

78. *Discussion.* The existing provisions that accommodate new periscope antennas in Section 74.641 and 78.105 do so only on the condition that applicants make a persuasive showing that no frequency conflicts exist in the area of intended operation.[154] This constraint ensures that new periscope antennas will not cause unacceptable interference to terrestrial or satellite users. We therefore decline to limit flexibility in BAS antenna selection at this time.

B. BAS Service Rules (Part 74)

1. Temporary Conditional Authority

79. In the *Notice,* the Cornmission proposed to allow BAS applicants who apply for new or modified stations to operate under temporary conditional authority after an application has been properly filed with the Commission.[155] This type of operating authority is permitted in other coordinated services, such as those authorized under Parts 90 and 101 and Remote Pickup BAS.[156] The Commission proposed to make such temporary conditional authority subject to the following conditions:

- The applicant must be eligible to operate the particular class ofbroadcast auxiliary station.
- The station must be operating in conformance with the rules for that particular class of station and in accordance with the terms of the frequency coordination.
- The application does not propose operation in an area that requires international coordination.
- The application does not request a waiver of the Commission's rules.

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[150] *See* Appendix A. *infra*, at § 2.106, footnote NG175: Pan 74

[151] A periscope antenna configuration uses a transmitting antenna oriented to produce a vertical radiation pattern, with a flat or off-axis parabolic reflector, mounted above the transmitting antenna, which directs the beam in a horizontal path toward the receiving antenna. This type of antenna facilitates increased terrain clearance without long transmission lines. while permitting the active equipment to be located at or near ground level for ease of maintenance.

[152] *See,* e.g., 47 C.F.R. § 101.115(d).

[153] MRC Comments at 8.

[154] *See* 47 C.F.R. § 74.641(c).

[155] *Notice at* ¶ 46

[156] 47 C.F.R. §§ 90.159(b), 101.31, and 74.431(g)